

REMARKS

Applicant hereby responds to the office action of October 14, 2005, in the above-referenced patent application. Claims 1-64 are pending in the above-referenced patent application. Claims 1-30 and 33-62 were rejected, while Claims 31, 32, 63 and 64 were objected to as being dependent on a rejected base claim, but deemed allowable if rewritten in independent form including limitations of base claims and any intervening claims. Applicant wishes to thank the Examiner for detailing the allowable claims.

Claims 1, 3-6, 11-13, 15, 18-20, 27, 29, 33, 35-38, 43-45, 50, 51, 59 and 61 were rejected under 35 USC 102(e) as being anticipated by USPN 6,657,731 to Tapalian et al. ("Tapalian"). Claims 1, 3-5, 11-13, 15, 18-20, 27, 29, 33, 35-38, 43-45, 50, 51, 59 and 61 were rejected under 35 USC 102(e) as being anticipated by USPN 6,661,938 to Lim et al. ("Lim"). Claims 1, 3, 18, 29, 33, 35, 38, 50 and 61 were rejected under 35 USC 102(e) as being anticipated by US Patent Application no. 2004/0023396 for Boyd et al. ("Boyd"). Claims 30 and 62 were rejected under 35 USC 103(a) as being unpatentable over Tapalian, Lim or Boyd. Claims 2, 20-25, 34 and 52-57 were rejected under 35 USC 103(a) as being unpatentable over Tapalian or Lim. Claims 7, 16, 17, 39, 48 and 49 were rejected under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of USPN 5,846,708 to Hollis et al. ("Hollis"). Claims 10 and 42 were rejected under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of USPN 6,798,947 to Ilchenko. Claims 8, 9, 14, 28, 40, 41, 46, 47 and 60 were rejected under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of USPN 6,195,187 to Soref et al.

("Soref"). At the outset Applicant respectfully submits that the Office Action has utilized omnibus rejections under 35 USC 102(e) and 103(a), without specific rejections referring to specific claims. This had made the Office Action confusion, and difficult for the Applicant to respond to. In the following, Applicants attempt to respond to the rejections in good faith as best as understood from the Office Action.

Drawings

The drawings were objected to because the reference numbers referred to in the specification regarding Fig. 8 are not found in the figures, and the reference numbers 44, 46, 46a, 46b, 36 (with respect to Fig. 6) and flow channel 28 are not found in the figures.

The specification, page 17, paragraph starting on line 15 and ending on line 23 (paragraph [0057]), has been amended to delete reference numbers 28 and 44 without prejudice. Figs. 6 has been amended to include reference number 36 found in the description. Fig. 8 has been amended to include reference numbers 10, 20, 52 and 54 found in the description. Fig. 5a has been amended to include reference numbers 46 and 46a found in the description. Fig. 5b has been amended to include reference numbers 42, 46 and 46b found in the description. Attached please find three replacement drawing sheets depicting amended Figs. 5a, 5b, 6 and 8 respectively. No new matter has been added.

Rejections under 35 U.S.C. 112

Claims 15, 26, 27, 31, 41, 58 and 59 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 15, 31 and 41 have been amended to overcome the rejections.

Regarding claims 26, 27, 58 and 59, the Examiner states that it is unclear how the substance is related to the analyte. Applicant respectfully turns attention of the Examiner to an example in the specification page 15, lines 8-17, wherein an example role of the analyte is described: "In order to conduct a measurement to determine the change in path length of the resonator 10, it is necessary to coat the resonators 10 with very thin layers of reagents 16 to convert the resonators 10 into optical devices whose optical properties are influenced when specific reagents or analytes attach to their surface. The selectivity of the measurement relies on the selectivity of the surface treatments, which are designed to specifically bond to the desired analytes. The high Q and small size of silicon-based microresonators 10, together with the maturity of silicon CMOS processing facilities and the integration of germanium detectors 18, provide a very sensitive and manufacturable analysis platform for such indirect chemical detectors."

As such, applicant respectfully submits that the claims are definite as they stand, and specially so in light of the specification. If the Examiner has further questions/comments in this regard, Applicant would be more than happy to respond accordingly.

Rejections under 35 U.S.C. 102(e)

Rejection of Claims 1, 3-6, 11-13, 15, 18-20, 27, 29, 33, 35-38, 43-45, 50, 51, 59 and 61 under 35 USC 102(e) as being anticipated by Tapalian is respectfully traversed because, for at least the following reasons, Tapalian does not disclose all of the claimed limitations.

At the outset, Applicant wishes to point out that the Tapalian reference (USPN 6,657,731) published on the USPTO web site uses column and line numbers, rather than paragraph numbers as used by the Examiner in the rejections, which makes it difficult to understand the Examiner's rejections in the Office Action. Nevertheless, Applicant attempts to respond to the rejections below as best as understood from the Office Action.

Regarding **Claim 1**, as described and shown in Fig. 1B of Tapalian, unlike the claimed invention herein, Tapalian does not disclose a substrate and an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance, as required by Claim 1. Further, in Tapalian, Fig. 1 (relied on the examiner), the resonator 102 is not fabricated in the substrate 120. Further, Tapalian does not disclose a detector *coupled to the microresonator* to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator, as claimed herein.

Regarding **Claim 3**, there is no disclosure in Tapalian that the microresonator is a semiconductor optical ring microresonator, as claimed, and the Examiner has not referred to any such disclosure in Tapalian.

Regarding **Claim 6**, nothing in Tapalian discloses that the performance parameter is the absorption loss of whispering gallery modes in the microresonator, as claimed. The phrase “absorption loss” or equivalent cannot even be found in Tapalian as cited by the Examiner (paragraph [0033]).

Regarding **Claim 11**, nothing in Tapalian discloses a plurality of microresonators and a corresponding plurality of detectors formed into an array coupled by the waveguide to the light source in which the plurality of microresonators are exposed to a plurality of substance, as claimed. Further, Tapalian Fig. 5 (relied on by the Examiner) does not disclose a plurality of detectors, as claimed.

Regarding **Claims 12**, Tapalian does not disclose an addressing circuit for reading the array, as claimed. Further, it is respectfully submitted that an addressing circuit for reading the array is not inherent, nor required, in Tapalian. The Examiner has simply concluded, rather than succinctly show and explain, why accessing and reading out detectors requires an addressing circuit, as claimed, rather than other options for doing so. It is respectfully submitted that the Examiner’s conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 13**, there is nothing in Tapalian about CMOS integrated read-out circuitry fabricated in the substrate coupled to the addressing circuit, as claimed. Further, it is respectfully submitted that a CMOS integrated read-out circuitry fabricated in the substrate, is not inherent, nor required, in Tapalian. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 15**, Tapalian does not disclose that the waveguide comprises a CMOS fabricated waveguide and the detector is comprises a detector deposited onto the CMOS fabricated waveguide, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 18**, Tapalian does not disclose that the microresonator is characterized by an optical absorption loss determined by direct optical excitation of the substance when in contact with the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 19**, Tapalian does not disclose a plurality of microresonators corresponding to a plurality of different resonant frequencies to generate an absorption spectrum of the substance, as claimed. It is respectfully submitted that the Examiner's

conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 20**, Tapalian does not disclose that a coating on the resonator reacts with the substance to form an altered optical parameter which in turn alters an optical parameter of the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 27**, Tapalian does not disclose a plurality of microsensors organized in an addressable array on the substrate, the plurality of corresponding resonators having a selectively pretreated surface, a change in refractive index or waveguide loss of ones of the plurality of resonators arising as a result of selective attachment of an analyte to the pretreated surface being measured, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 29**, Tapalian does not disclose that the substrate is a silicon-on-insulator (SOI) substrate, where the waveguide and microresonator are fabricated on the substrate by means of SOI processes and where the detector is fabricated on the substrate by means of CMOS fabrication processes, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Tapalian, and the Examiner has not provided a reference that discloses such limitations.

From the Office Action, it appears that method Claims 33, 35-38, 43-45, 50, 51, 50 and 61, were rejected under 35 USC 102(e) over Tapalian for essentially the same reasons as rejection of claims 1, 3-6, 11-13, 15, 18-20, 27 and 29. It is respectfully submitted that for at least the reasons provided above, Tapalian does not disclose all of the limitations of Claims 33, 35-38, 43-45, 50, 51, 50 and 61. Further, Applicant respectfully disagrees that a method of manufacturing adds no structural limitations to the claims. The Examiner has not the burden required under 35 USC 102(e) in rejection method Claims 33, 35-38, 43-45, 50, 51, 50 and 61 over Tapalian.

Rejection of Claims 1, 3-5, 11-13, 15, 18-20, 27, 29, 33, 35-38, 43-45, 50, 51, 59 and 61 under 35 USC 102(e) as being anticipated by Lim is traversed because, for at least the following reasons, Lim does not disclose all of the claimed limitations.

Regarding **Claim 1**, unlike the claimed invention herein, Lim does not disclose an optical microresonator fabricated in the substrate exposed to the substance to allow an interaction between the microresonator and substance. Further, Lim does not disclose a waveguide coupling the source of light to the optical microresonator (element 102 in Lim is not a waveguide as claimed, rather a band gap portion of the resonator 104).

Regarding **Claim 4**, in Lim, col. 3, line 33, the Q factor is specified as up to 10,000, whereas Claim 4 herein requires that the microresonator has an initial Q of 10,000 or greater.

Regarding **Claim 11**, Lim, col. 4, lines 5-10 does not disclose a plurality of detectors formed into an array coupled by the waveguide to the light source, as claimed. Further, Lim does not disclose a plurality of microresonators and a corresponding plurality of detectors formed into an array coupled by the waveguide to the light source in which the plurality of microresonators are exposed to a plurality of substances, as claimed.

Regarding **Claims 12**, Lim does not disclose an addressing circuit for reading the array, as claimed. Further, it is respectfully submitted that an addressing circuit for reading the array is not inherent, nor required, in Lim. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations. The Examiner has simply concluded, rather than succinctly show and explain why accessing and reading out detectors requires an addressing circuit, as claimed, rather than other options for doing so.

Regarding **Claim 13**, there is nothing in Lim about CMOS integrated read-out circuitry fabricated in the substrate coupled to the addressing circuit, as claimed. Further, it is respectfully submitted that a CMOS integrated read-out circuitry fabricated in the substrate, is not inherent, nor required, in Lim. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 15**, Lim does not disclose that the waveguide comprises a CMOS fabricated waveguide and the detector comprises a detector deposited onto the CMOS fabricated waveguide, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 18**, Lim does not disclose that the microresonator is characterized by an optical absorption loss determined by direct optical excitation of the substance when in contact with the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 19**, Lim does not disclose a plurality of microresonators corresponding to a plurality of different resonant frequencies to generate an absorption spectrum of the substance, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 20**, Lim does not disclose that a coating on the resonator reacts with the substance to form an altered optical parameter which in turn alters an optical parameter of the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 27**, Lim does not disclose a plurality of microsensors organized in an addressable array on the substrate, the plurality of corresponding resonators having a selectively pretreated surface, a change in refractive index or waveguide loss of ones of the plurality of resonators arising as a result of selective attachment of an analyte to the pretreated surface being measured, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 29**, Lim does not disclose that the substrate is a silicon-on-insulator (SOI) substrate, where the waveguide and microresonator are fabricated on the substrate by means of SOI processes and where the detector is fabricated on the substrate by means of CMOS fabrication processes, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Lim, and the Examiner has not provided a reference that discloses such limitations.

From the Office Action, it appears that method **Claims 33, 35-38, 43-45, 50, 51, 50 and 61**, were rejected under 35 USC 102(e) over Lim for essentially the same reasons as rejection of claims 1, 3-6, 11-13, 15, 18-20, 27 and 29. It is respectfully submitted that for at least the reasons provided above, Lim does not disclose all of the limitations of Claims 33, 35-38, 43-45, 50, 51, 50 and 61. Further, Applicant respectfully disagrees that a method of manufacturing adds no structural limitations to the claims. The

Examiner has not the burden required under 35 USC 102(e) in rejection method Claims 33, 35-38, 43-45, 50, 51, 50 and 61 over Lim.

Rejection of Claims 1, 3, 18, 29, 33, 35, 38, 50 and 61 under 35 USC 102(e) as being anticipated by Boyd is traversed because, for at least the following reasons, Boyd does not disclose all of the claimed limitations.

Regarding **Claim 1**, Boyd does not disclose all of the claimed limitations. For example, Boyd does not disclose a substrate and an optical microresonator fabricated in the substrate exposed to a substance to allow an interaction between the microresonator and substance, as claimed. Fabrication of microresonator 12 on a substrate is not described, nor substrate shown, in Boyd. Nor does Boyd show that a detector is coupled to the microresonator to measure a performance parameter of the optical microresonator sensitive to interaction of the substance with the optical microresonator, as claimed. Waveguide 14 in Boyd is not *coupled* to the microresonator 12, as claimed.

Regarding **Claim 3**, the Examiner has not shown that Boyd discloses that the microresonator is a semiconductor optical ring microresonator, as claimed.

Regarding **Claim 18**, Boyd does not disclose that the microresonator is characterized by an optical absorption loss determined by direct optical excitation of the substance when in contact with the microresonator, as claimed. It is respectfully

submitted that the Examiner's conclusion is not based on any disclosure in Boyd, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 29**, Boyd does not disclose that the source of light comprises an external laser, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Boyd, and the Examiner has not provided a reference that discloses such limitations.

From the Office Action it appears that **Claim 33** was rejected under 35 USC 102(e) over Boyd for essentially the same reasons as rejection of claim 1. It is respectfully submitted that for at least the reasons provided above, Boyd does not disclose all of the limitations of Claim 33.

Regarding **Claim 35**, Boyd does not disclose that detecting the interaction between the microresonator and substance includes detecting the optical performance of a semiconductor optical ring microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Boyd, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 38**, Boyd does not disclose that measuring the optical performance of a microresonator comprises measuring the absorption loss of whispering gallery modes in the microresonator, as claimed. In paragraph [0054] (relied on by the Examiner) Boyd only mentions that the transmission can be smaller than unity as the

result of the absorption by biological materials located near the resonator structure or due to unwanted losses associated with poor confinement of light within the resonator.

Clearly then, Boyd does not disclose measuring the absorption loss of whispering gallery modes in the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Boyd, and the Examiner has not provided a reference that discloses such limitations.

Regarding **Claim 50**, for at least the reasons provided in relation to Claim 38, Boyd does not disclose that detecting the interaction between the microresonator and substance comprises measuring an optical absorption loss of the microresonator arising from direct optical excitation of the substance when in contact with the microresonator, as claimed. It is respectfully submitted that the Examiner's conclusion is not based on any disclosure in Boyd, and the Examiner has not provided a reference that discloses such limitations.

Rejection of **Claim 61** is traversed for at least the reasons provided above in relation to rejection of claim 29.

Rejections under 35 U.S.C. 103(a)

Rejection of Claims 30 and 62 under 35 USC 103(a) as being unpatentable over Tapalian, Lim or Boyd, is respectfully traversed because for at least the following reasons the references, alone or in combination, do not disclose all of the claimed limitations.

As discussed, Tapalian, Lim or Boyd do not disclose the limitations of base claims 1 and 33. Further, it is respectfully submitted that the references, alone or in combination, do not disclose that the source of light comprises a filtered tungsten filament lamp, a filtered broad-band light emitting diode, a Fabry-Perot cleaved cavity laser, a vertical cavity surface emitting (VeSEL), or a grating coupled surface emitting laser directly bonded onto the substrate, as required by Claims 30 and 62. No prima facie case of obviousness has been established. It is respectfully submitted that the Examiner's rejection is not based on any disclosure in the references, and the Examiner has not provided a reference that discloses such limitations, relying instead on assumptions rather than clear showing. Such limitations are not obvious or well known in the art.

It is well settled that in order for a modification or combination of the prior art to be valid, the prior art itself must suggest the modification or combination, "...invention cannot be found obvious unless there was some explicit teaching or suggestion in the art to motivate one of ordinary skill to combine elements so as to create the same invention." *Winner International Royalty Corp. v. Wang*, No. 96-2107, 48 USPQ.2d 1139, 1140 (D.C.D.C. 1998) (emphasis added). "The prior art must provide one of ordinary skill in the art the motivation to make the proposed molecular modifications needed to arrive at the claimed compound." *In re Jones*, 958 F.2d 347, 21 USPQ.2d 1941, 1944 (Fed. Cir. 1992) (emphasis added). Neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of

the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

Rejection of Claims 2, 20-25, 34 and 52-57 under 35 USC 103(a) as being unpatentable over Tapalian or Lim, is respectfully traversed because for at least the following reasons the references, alone or in combination, do not disclose all of the claimed limitations.

As discussed, Tapalian or Lim do not disclose the limitations of base claims 1 and 33. As per Claims 2, 20-22, 34 and 52-54, Tapalian or Lim, alone or in combination, do not disclose a coating or a polymer coating as claimed. No prima facie obviousness has been established. Further, Tapalian or Lim, alone or in combination, do not disclose: a polymer coating disposed on the microresonator, which polymer coating is reactive with the substance (claims 2, 34), the coating reacts with the substance to form an altered optical parameter which in turn alters an optical parameter of the microresonator (claims 20, 52), the altered optical parameter is the refractive index of the coating or the waveguide loss of the microresonator (claims 21, 53), or that the coating reacts only with the substance (claims 22, 54). The Examiner has not shown where the references disclose such limitations so that Applicant can respond.

Further, it is respectfully submitted that the Examiner's rejection that selecting a coating is obvious, is not based on any disclosure in the references, and the Examiner has not provided a reference that discloses such limitations, relying instead on assumptions

rather than clear showing. Such limitations are not obvious or well known in the art. Neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

As per **Claims 23 and 55**, Tapalian or Lim, alone or in combination, do not disclose that the coating is reacts only with the substance by means of an enzyme linked immunosorbent assay (ELISA), as claimed. The Examiner has not shown where the references disclose such limitations so that Applicant can respond. No prima facie case of obviousness has been established.

Further, it is respectfully submitted that the Examiner's rejection that using ELISA is obvious, is not based on any disclosure in the references, and the Examiner has not provided a reference that discloses such limitations, relying instead on assumptions rather than clear showing. Such limitations are not obvious or well known in the art. Neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references

suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

As per **Claims 24, 25, 56 and 47**, Tapalian or Lim, alone or in combination, do not disclose a microfountain pen and where the coating is applied to the microresonator by the microfountain pen (claims 24, 56). Further, Tapalian or Lim, alone or in combination, do not disclose an elastomeric flow channel in communication with the microresonator and where the coating is applied to the microresonator by a functionalization treatment by means of the elastomeric flow channel (claims 25, 47). The Examiner has not shown where the references disclose such limitations so that Applicant can respond. No prima facie case of obviousness has been established.

Further, it is respectfully submitted that the Examiner's rejection that elastometric coating or choosing how coating is applied, is well known, is not based on any disclosure in the references, and the Examiner has not provided a reference that discloses such limitations, relying instead on assumptions rather than clear showing. Such limitations are not obvious or well known in the art. Neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

Rejection of Claims 7, 16, 17, 39, 48 and 49 under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of Hollis, is respectfully traversed because for at least the following reasons the references, alone or in combination, do not disclose all of the claimed limitations.

As discussed, Tapalian or Lim do not disclose the limitations of base claims 1 and 33. Regarding **Claims 7 and 39**, Tapalian or Lim (alone or in combination) do not disclose that the performance parameter is the quality factor of the microresonator, as claimed. Hollis (col. 2, line 55) mentions that changes in quality factor (Q) of the resonator caused by formation of hybridized molecules may be measured. However, Hollis is non-analogous art, and does not teach a detector coupled to the microresonator to measure a the quality factor of the microresonator sensitive to interaction of the substance with the optical microresonator.

Further, neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

Regarding **Claims 16, 17, 48 and 49**, Tapalian or Lim (alone or in combination) do not disclose a microfluidic circuit for communicating the substance to the microresonator (claims 16, 49), or pneumatic valves and peristaltic pumps defined by multi-layer replication lithography for delivering picoliter volumes of the substance to the microresonator (claims 17, 49). Hollis, Fig. 18 (relied on by the Examiner) shows a circuit which in relevant description is characterized as a microfluidic system for synthesizing unique genosensor probes in situ in a test site. The circuits in Fig. 18 of Hollis are not microfluidic circuits for communicating a substance to a microresonator. Indeed, the circuits in Fig. 18 of Hollis do not provide pneumatic valves or peristaltic pumps defined by multi-layer replication lithography for delivering picoliter volumes of the substance to the microresonator. Further, neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

Rejection of **Claims 10 and 42** under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of Ilchenko, is respectfully traversed because for at least the following reasons the references, alone or in combination, do not disclose all of the claimed limitations.

As discussed, Tapalian or Lim do not disclose all of the limitations of base claims 1, 33. Further, Tapalian or Lim (alone or in combination) do not disclose that the detector comprises a read-out optic fiber coupled to a grating coupler (claims 10, 42). Iltchenko describes Fig. 8 (relied on by the Examiner), as showing surface grating 410 which couples optical information into the microsphere 400. However, there is no disclosure in Iltchenko that a *detector* comprises a *read-out* optic fiber coupled to a *grating coupler*, as claimed. Further, neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.

Rejection of Claims 8, 9, 14, 28, 40, 41, 46, 47 and 60 under 35 USC 103(a) as being unpatentable over Tapalian or Lim in view of Soref, is respectfully traversed because for at least the following reasons the references, alone or in combination, do not disclose all of the claimed limitations.

As discussed, Tapalian or Lim do not disclose all of the limitations of base claims 1, 33. Further, Tapalian or Lim (alone or in combination) do not disclose all of the limitations of claims 8, 9, 14, 28, 40, 41, 46, 47 and 60. Soref, does not disclose that: the detector is a germanium detector and the substrate is a silicon-on-insulator (SOI) heterostructure (claim 8), CMOS integrated read-out circuitry fabricated in the substrate

and coupled to the germanium detector (claim 9), the detector comprises a polycrystalline germanium detector fabricated proximate to the microresonator (claim 14), a silicon-on-insulator (SOI) substrate where the waveguide and microresonator are fabricated on the substrate by means of SOI processes and where the detector is fabricated on the substrate by means of CMOS fabrication processes (claim 28), detecting the interaction between the microresonator and substance comprises detecting the optical output of the microresonator with a germanium detector and where providing the substrate comprises providing a silicon-on-insulator (SOI) heterostructure (claim 40), detecting the interaction between the microresonator and substance comprises coupling light from the microresonator to a read-out optic fiber coupled to a grating coupler (claim 41), detecting the interaction between the microresonator and substance comprises detecting the interaction with a polycrystalline germanium detector fabricated proximate to the microresonator (claim 46), fabricating the waveguide with CMOS processes and fabricating the detector in communication with the waveguide during a post-processing step following CMOS fabrication of the waveguide (claim 47), providing a silicon-on-insulator (SOI) substrate fabricating the waveguide and microresonator on the substrate by means of SOI processes and fabricating the detector on the substrate by means of CMOS fabrication processes (claim 60). The Examiner has not shown where such limitations are disclosed in the references. The limitations are not obvious or well known in the art. No prima facie case of obviousness has been established.

Further, neither of the references suggests the motivation to modify or combine the references as proposed. The references are individually complete and functionally

independent for their limited specific purposes and there would be no reason to make the modification proposed by the Office Action. Therefore, because neither of the prior art references suggests the combination and modifications proposed by the Office Action the combination and modifications are improper.


With respect to all claim rejections under 35 USC 103(a), on the one hand Examiner states that the claimed limitations are advantageous, but on the other hand the Examiner terms it simply as an obvious design element. If Applicant's claimed limitations were in fact obvious, those skilled in the art would have modified the teachings of Lutz to incorporate the teachings of Ichinose. The fact that the references have not been modified, to implement Applicant's claimed invention, despite its great advantages, indicates that Applicant's claimed invention is neither obvious nor taught by the prior art. Further, Applicant respectfully submits that the Office Action is improperly using "hindsight" and the teachings of Applicant's own claimed invention in order to combine references to render Applicants' claims obvious.

CONCLUSION

For the above reasons, and other reasons, it is respectfully submitted that the application should be allowed. Please continue to send all communications to the agent of record.

Please charge any deficit or credit any surplus to our Deposit Account No. 01-1960. A duplicate copy of this page is enclosed for this purpose.

Attachment(s): Three (3) Replacement Drawing Sheets

<p align="center">CERTIFICATE OF MAILING</p> <p>I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: MS Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on January <u>17</u>, 2006.</p> <p>By Sarah A. Nielsen</p> <p> _____ Signature</p>

Respectfully submitted,



Michael Zarrabian (Date)
Registration No. 39,886
Myers Dawes Andras & Sherman, LLP
19900 MacArthur Blvd., 11th Floor
Irvine, CA 92612
(949) 223-9600
(949) 223-9610 – Fax
USPTO Customer No.: 23386